

*Response to Office Action  
U.S. Serial No. 10/786,991  
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## REMARKS

Claims 1-14 are pending in the present application. By this amendment, Claims 1 and 6 have been amended; and Claims 9-14 have been added. Applicants respectfully request reconsideration of the present application in view of the foregoing amendments and the following remarks. Support for the amendments may be found in paragraph 26. It is respectfully submitted that no new matter has been added.

### I. FORMAL MATTERS

#### *Allowable Subject Matter*

Applicants wish to thank Examiner Cygan for acknowledging that claims 5 and 8 include allowable subject matter and would be allowed if rewritten in independent form and including all of the limitations of any base claim. As set forth in greater detail below, Applicants respectfully submit that claims 1 and 6 are allowable over the prior art of record. Nevertheless, Applicants have added new claims 9-14. New claim 9 corresponds to original claims 1 and 5. Accordingly, as new claim 9 includes the allowable subject matter of claim 5 and the claim features of claim 1, it is respectfully submitted that new claim 9 is allowable. New claims 10-12 correspond to original claims 2-4. New claim 13 corresponds to original claims 6 and 8. Accordingly, as new claim 13 includes the allowable subject matter of claim 8 and the claim features of claim 6, it is respectfully submitted that new claim 13 is allowable. New claim 14 corresponds to original claim 7.

### II. PRIOR ART REJECTIONS

#### *Claim Rejections Under 35 U.S.C. §102 (b)*

Claims 1-3, 6 and 7 stand rejected under 35 U.S.C. §102 (b) as being anticipated by U.S. Patent No. 4,275,587 to Gutoff (hereafter "Gutoff"). This rejection is respectfully traversed.

Applicants' claimed invention, as set forth in Claim 1, provides, *inter alia*, a method for determining the wettability of a particulate surface comprising inserting a test device having the particulate surface into a test liquid to form a liquid meniscus; measuring the liquid meniscus to generate a liquid meniscus measurement; and calculating the wettability of the particulate surface

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using the liquid meniscus measurement; wherein the test device has a cylindrical or a partially cylindrical surface. Applicants' claimed invention, as set forth in Claim 6, provides, *inter alia*, a system for determining the wettability of particulate surface comprising a test device having the particulate surface; a test liquid; and a measurement device; wherein the test device has a cylindrical or a partially cylindrical surface.

As set forth in the Office Action, Guttoff discloses a method and system for determining the wettability of a substrate coated with a particulate gelatin coating. The coated substrate is inserted in a test liquid forming a liquid meniscus that is optically analyzed to determine the meniscus height that is used to calculate wettability.

It is respectfully submitted that Guttoff fails to teach or suggest Applicants' claimed invention. Guttoff discloses the uses of a solid substrate, such as paper, plastic or metal, that is plunged into a bath of liquid. The substrate used in Guttoff is not taught or suggested as being a substrate having a cylindrical or a partially cylindrical surface. Therefore, Guttoff fails to teach or suggest Applicants' claimed invention.

In the present invention, a test device having a cylindrical or a partially cylindrical surface is used for measurement. This is done to take advantage of certain physical phenomena in a very unique and non-intuitive way. A common problem with most techniques for particle wettability, such as the ones described in Guttoff, is that the values derived from measurements on particles are largely impacted by effective roughness or surface corrugation due to the bound particles such that the results are usually far from values measured on flat surfaces.

In typical measurements with flat plates, the height of the liquid meniscus is measured while the light path is perpendicular to the width of the plate (height, width, and thickness as defining parameters). With particle experiments, this type of measurement is difficult since diffraction from the particles will reduce the resolution of the meniscus height. It is also difficult—due to depth of field issues—to discern whether or not the meniscus is measured from the particle surface, the adhesive underlayer, or a combination of the two. It is possible to rotate the plate such that the thickness of the plate is perpendicular to the lightsource; however, in this configuration edge effects, due to the sudden curvature of the edge of the plate) produce artifacts in measurements.

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In the present invention, however, curved surfaces may be used. Curved surfaces provide one or more advantages: (1) no edge effects are present, (2) meniscus height is measured from particle surface, (3) provides the ability to rotate measurement around the rod to get an 'averaged' contact angle by measuring the meniscus at different area on the rod, (4) ease of homogenous application of particle though rolling the rod in a bed of particles, and/or (5) an image analysis approach can also be used to solve for the contact angle via an optical approach of the solution of the Wilhelmy method. This indicates that an image profile from the meniscus on the rod may be used to calculate the mass of liquid displaced by the rod wettability by integrated around the rod. Using the density of the liquid and gravitational acceleration this may be used to calculate the contact angle from the equation:

$$\gamma \cos \theta = \Delta W / p$$

where  $\gamma$  is the surface tension of the measurement liquid,  $\Delta W$  is the calculated weight of liquid displaced, and  $p$  is the perimeter of the rod. This approach differs from the simple measurement of liquid height described earlier in which the capillary rise profile is assumed and not measured.

Therefore, since the present invention corrects the problems associated with flat surfaces, and since this aspect is not taught or suggested by Gutoff, it is respectfully submitted that Gutoff fails to teach or suggest Applicants' claimed invention.

For at least the reasons given above, Applicants respectfully submit that Claims 1 and 6 are allowable over the prior art of record. Furthermore, as Claims 2-3 and 7 recite additional claim features and depend from Claim 1 or Claim 6, these claims are also allowable over the prior art of record.

*Claim Rejections Under 35 U.S.C. §103 (a)*

Claim 4 stands rejected under 35 U.S.C. §103 (a) as being unpatentable over Gutoff in view of U.S. Patent No. 5,815,256 to Fukunaga (hereafter "Fukunaga"). This rejection is respectfully traversed.

Applicants' claimed invention may be relied upon as above.

The description of Gutoff may be relied upon as above.

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As set forth in the Office Action, Fukunaga teaches optical meniscus profiling to determine the wettability of an immersed substrate.

It is respectfully submitted that the combination of Gutoff and Fukunaga fails to teach or suggest Applicants' claimed invention. As previously discussed, Gutoff fails to teach or suggest a test device having a cylindrical or a partially cylindrical surface. It is respectfully submitted that Fukunaga fails to remedy this deficiency. Fukunaga discloses the use of a flat substrate to determine the wettability of an immersed substrate. As such, Fukunaga fails to teach or suggest a test device having a cylindrical or a partially cylindrical surface. Therefore, it is respectfully submitted that the combination of Gutoff and Fukunaga fails to teach or suggest Applicants' claimed invention.

For at least the reasons given above, Applicants respectfully submit that Claim 1 is allowable over the prior art of record. Furthermore, as Claim 4 recites additional claim features and depend from Claim 1, this claim is also allowable over the prior art of record.

### **III. CONCLUSION**

For at least the reasons given above, Applicants submit that Claims 1-14 define patentable subject matter. Accordingly, Applicants respectfully request allowance of these claims.

The foregoing is submitted as a full and complete Response to the Office Action mailed February 10, 2005, and early and favorable consideration of the claims is requested.

Should the Examiner believe that anything further is necessary in order to place the application in better condition for allowance, the Examiner is respectfully requested to contact Applicants' representative at the telephone number listed below.

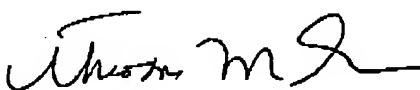
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No additional fees are believed due; however, the Commissioner is hereby authorized to charge any deficiency, or credit any overpayment, to Deposit Account No. 50-0951.

Respectfully submitted,

AKERMAN SENTERFITT

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